

### Claims

What is claimed is:

1. A system being operated by an outside source of fluid and producing hydraulic power, said system comprising a free piston pump being operated by said outside source fluid and a control system:

a free piston pump being operated by said outside source fluid, said free piston pump having a housing having a pair of chambers positioned therein, a pair of end covers having a pair of chambers therein, a first valve being operatively attached to one of said pair of end cover, said first valve being movable into an open position fluidly connecting said fluid with one of said pair of chambers, a second valve being operatively attached to another one of said pair of end covers, said second valve being movable into an open position fluidly connecting said fluid with another one of said pair of chambers, at least a single piston, said piston being slidably positioned in at least one of said pair of chambers, a shaft being attached to said piston said shaft having a first end being slidably positioned in one of said pair of chambers;

a control system, said control system including a computer, a plurality of sensors being attached to said free piston pump, and a plurality of lines interconnecting said sensors and said computer.

2. The system of claim 1 wherein said free piston pump includes a pair of pistons and a pair of shafts.

3. The system of claim 2 wherein said pair of pistons are connected by a plurality of rods.

4. The system of claim 2 wherein said free piston pump is a double acting pump.

5. The system of claim 1 wherein said system is used in combination with a reheating system.

6. The system of claim 5 wherein said bore has a preestablished circumferential configuration and said preestablished circumferential configuration is cylindrical.

7. The system of claim 1 having a plurality of free piston pumps.

8. A free piston pump being operated by an outside source fluid, said free piston pump comprising:

a housing having a pair of chambers positioned therein;

a pair of end covers having a pair of chambers therein;

a first valve being operatively attached to one of said pair of end cover, said first valve being movable into an open position fluidly connecting said fluid with one of said pair of chambers;

a second valve being operatively attached to another one of said pair of end covers, said second valve being movable into an open position fluidly connecting said fluid with another one of said pair of chambers;

a pair of pistons, one of said pair of pistons being slidably positioned in each one of said pair of chambers;

a first shaft being attached to one of said pair of pistons, said first shaft having a first end being slidably positioned in one of said pair of chambers;

a second shaft being attached to another of said pair of pistons, said second shaft having a first end being slidably position in another one of said pair of chambers.

9. The free piston pump of claim 8 wherein one of said pair of pistons being located in one of said pair of end covers and another of said pair of pistons being located in another of said pair of end covers.

10. The free piston pump of claim 8 wherein one of said pair of pistons has a preestablished diameter being less than a preestablished diameter of another of the pair of pistons.

11. The free piston pump of claim 8 wherein said pair of pistons are connected by a plurality of rods.

12. The free piston pump of claim 8 wherein said free piston pump is a double acting pump.

13. The free piston pump of claim 8 wherein said pair of chambers define a bore having a preestablished circumferential configuration and said piston has a circumferential configuration in which a seal is positioned.

14. The free piston pump of claim 13 wherein said preestablished circumferential configuration is cylindrical.

15. The free piston pump of claim 8 wherein each of said pair of chambers has a preestablished volume and as a preestablished volume of one of said pair of chambers decreases another preestablished volume of said another one of said pair of chambers increases.

16. The free piston pump of claim 8 wherein said first valve and said second valve are 3-way valves having an open position, a closed position, and a venting position.

17. A method of operating a system wherein a free piston pump receives power from an outside source of fluid, said free piston pump having a piston positioned in a chamber and a shaft positioned in another chamber; said method comprising the steps of:

sensing a plurality of positions of said piston within said chamber with a plurality of sensors;

sending a signal from said plurality of sensors to a computer;

directing said fluid to said chamber;

moving said piston within said chamber;

causing said shaft to move within said another chamber;

displacing a high pressure fluid from said another chamber.

18. The method of operating a system of claim 17 wherein said step of directing said fluid to said chamber includes moving a first valve to an open position.

19. The method of operating a system of claim 18 wherein said step of directing said fluid to said chamber includes moving a second valve into a venting position.

20. The method of operating a system of claim 18 wherein said step of displacing a high pressure fluid includes filling a chamber with a low pressure fluid.